

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the following discussion, is respectfully requested.

Claims 1, 3-6, and 9-13 remain pending in the present application. Claim 1 is amended and Claims 9-13 are added by the present amendment. Support for the amended claims can be found in the original specification, claims and drawings.¹ No new matter has been added.

In the outstanding Office Action, Claims 1, 3, and 4 were rejected under 35 U.S.C. §103(a) as unpatentable over Ito et al. (EP Patent Application No. 1146569, herein Ito) in view of De Francesco (U.S. Patent No. 5,733,511, herein De Francesco); Claims 5 and 6 were rejected under 35 U.S.C. §103(a) as obvious over Ito and De Francesco in view of Pote et al. (U.S. Patent No. 5,239,134, herein Pote).

In response to the above noted rejections under 35 U.S.C. § 103, Applicants respectfully submit that independent Claim 1 recites novel features clearly not taught or rendered obvious by the applied references.

Claim 1 recites, in part:

A method for plasma-enhanced chemical vapor deposition in which a discharge electrode and a substrate are disposed opposite to each other in a vacuum film formation chamber into which a gas for forming a film containing a substance has been introduced, and high-frequency electric power generated by a high-frequency electric power feeding circuit is fed to a plurality of feeding points provided to the discharge electrode through a plurality of external cables which are disposed outside the vacuum film formation chamber and then through a plurality of internal cables which are disposed inside the vacuum film formation chamber and which correspond with the external cables, respectively, so as to generate plasma between the discharge electrode and the substrate to vapor deposit the substance on the substrate,

wherein the discharge electrode is assembled from a plurality of longitudinal electrodes which are parallel to one another, *and a pair of*

¹ Support for amended Claim 1 can be found at least in Fig. 1 and at p. 12, ll. 7-15, of the specification; support for new Claims 9-12 can be found at least in Fig. 1 and at p. 12, ll. 7-19; and support for new Claim 13 can be found at least in Fig. 1 and at p. 16, ll. 4-22.

transverse electrodes which are parallel to one another, the transverse electrodes being perpendicular to the longitudinal electrodes and located at each end of the longitudinal electrodes, each of the transverse electrodes being provided with the plurality of feeding points

wherein phases of the high-frequency electric power at the feeding points are adjusted by changing electrical characteristics of the external cables, the high-frequency electric power being fed to the plurality of feeding points [Emphasis Added].

In rejecting the features of a method for plasma-enhanced chemical vapor deposition that utilizes a plurality of longitudinal electrodes and a pair of transverse electrodes, the Office Action relies especially on Figs. 2, 3, 5 and 8, and paras. [0062-0064] of Ito. Figs. 2, 3, 5 and 8 of Ito, however, fail to show a pair of parallel transverse electrodes located at each end of the longitudinal electrodes and perpendicular to the longitudinal electrodes.

The Office Action asserts that Fig. 2 shows a pair of parallel transverse electrodes opposite a longitudinal electrode. However, the two ellipsoids in Fig. 2 depict one end of the electrode as the feeding portion 9 and the other end as the ground portion 10. The two ellipsoids merely indicate the portions from which the longitudinal electrodes are fed and grounded, and do not represent physical structures. Thus, the ellipsoids do not represent a pair of transverse electrodes parallel to each other.

In fact, para. [0039] of Ito describes Fig. 2 as an expansion of Fig. 1 where a plurality of electrodes may be arrayed to correspond to the substrate width. In Fig. 1 of Ito, the feeding portion 9 of the longitudinal electrode is represented by a rectangle contact point, and the grounding portion is represented by the point of the wall at which the electrode is connected. Neither of these two points, however, represents transverse electrodes parallel to one another and perpendicular to the longitudinal electrodes.

Even if the feeding portions of the longitudinal electrodes were considered to form a transverse electrode, Ito still does not describe that each of the transverse electrodes is provided with the plurality of feeding points. In fact, Figs. 1 and 2 of Ito clearly show that

the feeding portions 9 are all located on one side of the longitudinal electrodes, while the grounding portions 10 are located on the opposite side. Thus, the feeding portions in Ito are not located on each of the transverse electrodes. Accordingly, Ito fails to disclose or suggest “a pair of transverse electrodes which are parallel to one another . . . ***each of the transverse electrodes being provided with the plurality of feeding points,***” as recited in amended Claim 1.

Furthermore, Fig. 8 depicts U-shaped inductive coupling electrodes where the feeding and the grounding portions are both located on the same side of the film forming chamber. Since the feeding portion 9 and the grounding portion 10 are both formed on the same wall, it is clear that the feeding and ground portions are not formed of a pair of parallel transverse electrodes. Thus, it is respectfully submitted that the feeding portion 9 and the grounding portion 10 shown in Figs. 2, 3, 5 and 8 are not formed of a pair of parallel transverse electrodes. Since Ito does not describe a pair of parallel transverse electrode, Ito also fails to describe transverse electrodes perpendicular to the longitudinal electrodes and located at each end of the longitudinal electrodes. Ito thus further fails to describe that each of the transverse electrodes are provided with feeding points.

Accordingly, Ito fails to disclose or suggest “wherein the discharge electrode is assembled from a plurality of longitudinal electrodes which are parallel to one another, ***and a pair of transverse electrodes which are parallel to one another, the transverse electrodes being perpendicular to the longitudinal electrodes and located at each end of the longitudinal electrodes, each of the transverse electrodes being provided with the plurality of feeding points,***” as recited in amended Claim 1.

Additionally, Ito describes a method that feeds amplitude-modulated high-frequency waves to change the distribution of the plasma density and film thickness (see Ito, para. [0053]). The claimed invention, on the other hand, describes feeding phase-modulated high-

frequency electric power to the feeding points. Accordingly, Ito fails to disclose or suggest “wherein phases of the high-frequency electric power at the feeding points are adjusted by changing electrical characteristics of the external cables,” as recited in amended Claim 1.

It is also respectfully noted that *In re Gordon* holds that there can be no suggestion or motivation to make a proposed modification if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Further, *In re Ratti* holds that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

In this regard, the claimed invention recites a method for plasma-enhanced chemical vapor deposition that employs a capacitive coupling type chemical vapor deposition (CVD) method, where the coupling electrodes are connected to a pair of transverse electrodes at feeding points. In a capacitive coupling type CVD, plasma is generated by the capacitance between the discharge electrode and the ground electrode. Ito, on the other hand, describes inductive coupling electrodes where the film forming chamber functions as the ground. In the case of an inductive coupling CVD apparatus, plasma is generated by an electric field by electromagnetic induction.

In fact, para. [0011] of Ito asserts that “it is meaningless to apply the method that is effective for the capacitive coupling PCVD method to the inductive coupling PCVD because the mechanism for maintaining the discharge is absolutely different between the inductive coupling and the capacitive coupling PCVD.”

As Ito does not recite a method for plasma-enhanced chemical vapor deposition that employs a capacitive coupling type CVD, it is respectfully submitted that modifying Ito to

create the claimed invention would require a substantial redesign of Ito. Further, such a modification would make Ito unsuitable for its intended purpose, namely generating a substrate by plasma-enhanced chemical vapor deposition by employing an inductive coupling type CVD device.

As the proposed modification would clearly change the principle operation of Ito by requiring a complete redesign of the device described, and such a redesign would no longer provide a method for plasma-enhanced chemical vapor deposition that employs an inductive coupling type CVD device, it is respectfully submitted that there is no suggestion or motivation to modify Ito to create the claimed invention. Consequently, Claim 1 (and Claims 3-6 and 9-13 dependent therefrom) is patentable over Ito.

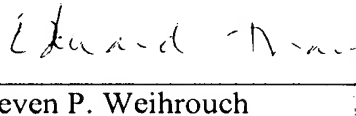
Further, De Francesco and Pote, applied secondary references, fail to remedy the above noted deficiencies of Ito.

Accordingly, for at least the reasons discussed above, Applicants respectfully request that the rejection of Claim 1 (and the claims that depend therefrom) under 35 U.S.C. § 103 be withdrawn. Furthermore, new Claims 9-13 are presented and depend from independent Claim 1. Thus, Claims 9-13 are believed to be patentable for at least the reasons discussed above.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that Claims 1, 3-6 and 9-13 patentably define over the applied references. The present application is therefore believed to be in condition for formal allowance and an early and favorable reconsideration of the application is therefore requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

Edward W. Tracy, Jr.
Registration No. 47,998